

108050000-TD0005-R00

Spallation Neutron Source

Linac Tunnel Smoke Exhaust System Functional System Design (FSD)

June, 2002



A U . S . D e p a r t m e n t o f E n e r g y M u l t i l a b o r a t o r y P r o j e c t

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

Linac Tunnel Smoke Exhaust Controls Description

TD80005 Rev 0

Operating Philosophy

Purpose:

- 1) Appropriately energize smoke removal fans/dampers, position smoke removal dampers and activate air handlers in response to
 - a) Receipt of a signal from the fire alarm system
 - b) Receipt of signal from PPS system
 - c) Receipt of signal from ODH system
- 2) Provide manual actuation of smoke removal system from the tunnel operating screen
- 3) Provide operator indication that fans/dampers are operating and that dampers are in the proper position.

Assumptions:

- 1) An ODH override will be implemented via placement of an additional solenoid valve controlled by the ODH system. No software actions are necessary in this system.
- 2) Hard wiring of MCCs will provide damper opening so that the damper opens when the fan is energized and vice versa. No software actions are necessary in this system.

Operator Controls and Operating Modes

- 1) OFF: All fans de-energized, all dampers closed
- 2) Auto:
Upon input from Fire Alarm system.
 - a. energize one outside air intake and two smoke exhaust fans/dampers in the tunnel,
 - b. open air intake and exhaust tunnel dampers,
 - c. open outside air intake damper at North wall of Front End buildingUpon input from PPS
 - a. All fans de-energized, all dampers closed (OFF mode)Upon input from ODH system
 - b. energize one outside air intake and two smoke exhaust fans/dampers in the tunnel,
 - c. open air intake and exhaust tunnel dampers,
 - d. open outside air intake damper at North wall of Front End building

OPERATOR INTERFACE DEFINITIONS

Local Hardware/Manual Operator Controls

- 1) HOA switch for tunnel intake fan/damper (*HS 2201A*)
- 2) HOA switch for tunnel exhaust fan/damper 1 (*HS 2105A*)
- 3) HOA switch for tunnel exhaust fan/damper 2 (*HS 2106A*)

- 4) ON/OFF switch for smoke removal (*HS 2051*)
- 5) ON/OFF switch for smoke removal (*HS 2107B*)
- 6) FAULT indicator light on MCC
- 7) READY indicator light on MCC
- 8) RUN indicator light on MCC

Software HMI/EPICS Digital Operator Controls

- 1) Smoke Exhaust Control
 - a. Off
 - b. Auto

Software HMI/EPICS Digital Displays

- 1) Status of tunnel intake fan/damper switch (*HS 2201A*)
- 2) Status of tunnel exhaust fan/damper 1 switch (*HS 2105A*)
- 3) Status of tunnel exhaust fan/damper 2 switch (*HS 2106A*)
- 4) Status of north wall damper switch (*HS 2051 or HS2107B*)
- 5) Tunnel intake fan/damper status (*PDS 2201*)
- 6) Tunnel exhaust fan/damper 1 status (*PDS 2105*)
- 7) Tunnel exhaust fan/damper 2 status (*PDS 2106*)
- 8) North wall damper positions (*ZSL 2051, ZSH 2051*)
- 9) Tunnel intake fan damper position (*ZSL 2201, ZSH 2201*)
- 10) Tunnel exhaust fan 1 damper position (*ZSL 2105, ZSH 2105*)
- 11) Tunnel exhaust fan 2 damper position (*ZSL 2106, ZSH 2106*)

Software HMI/EPICS Analog Operator Controls

None

Software HMI/EPICS Analog Displays

None

Software HMI/EPICS Alarms (via EPICS Alarm Handler)

- 1) System not in Auto
- 2) Receipt of fire alarm system signal
- 3) Receipt of PPS system signal
- 4) Receipt of ODH system signal
- 5) HOA switch for tunnel intake fan/damper not in auto
- 6) HOA switch for exhaust fan/damper 1 not in auto
- 7) HOA switch for exhaust fan/damper 2 not in auto

Control Logic Description

In OFF mode, the North Wall Damper is closed, the two Exhaust Fans/Dampers and Tunnel Intake Fan/Damper are de-energized, and the Tunnel Intake Fan Damper and two Exhaust Fan Dampers are closed.

In AUTO mode, an input from the PPS will place the system in the OFF mode condition. An input from the Fire Alarm System or ODH system, will energize the two Exhaust Fans/Dampers and Tunnel Intake Fan/Damper, open the Intake Fan Damper and two Exhaust Fan Dampers, and open the North Wall Damper.

Screens

